

a level which is latched by the latch 216, the decision signal from the first COMP 206a is asserted to a logic high, so that the first up/down counter 208a up counts the decision signal by one. Accordingly, a higher control value is applied to the LD driver 140, thereby raising the power level from the LD 160.

IN THE CLAIMS:

Please REPLACE claims 1, 10, 12, 14, 22, 23, 25, 26, 28, 38, 40, 43, 45, 52, and 54-56 and CANCEL claims 2-4 and 9 without prejudice or disclaimer in accordance with the following:

b1 1. (Amended) A method of controlling power of a laser diode emitting laser light on a disc by using a difference between a level of the laser light reflected by the disc and a reference level, the difference being detected after the laser light level reflected by the disc is compared with the reference level, the method comprising:

generating a periodic synchronization signal; and

controlling the power of the laser diode in synchronism with the synchronization

a2 signal by:

sampling the difference between the level of the laser light and the reference level to produce a sampled difference,

calculating an average of a predetermined number of the sampled difference to produce an average compared result, and

controlling the power level of the laser diode according to the average compared result.

a3 b 10. (Amended) The method of claim 1, wherein the synchronization signal is obtained by dividing a clock signal required to drive the disc by a ratio.

12. (Amended) An apparatus for controlling a power of a laser diode emitting laser light on a disc, comprising:

a photo diode which receives the laser light reflected by the disc to generate a current signal corresponding to a level of power of the reflected laser light;

a4 a comparator which outputs an output voltage corresponding to the current signal from the photo diode compares the output voltage with a reference voltage and outputs a binary decision signal which indicates which of the output voltage and the reference voltage is higher;

an up/down counter which up/down counts the binary decision signal in

accordance with the comparison result of the comparator to generate a count result;

a laser diode driver which controls a level of the power of the laser diode according to the count result of the up/down counter; and

an automatic power (APC) controller which controls an automatic power control of the laser diode, the APC controller being interposed between the up/down counter and the laser diode driver, the APC controller sampling the counted result from the up/down counter and latching an average of a predetermined number of the sampled counted results in synchronism with a periodic synchronization signal, and outputting the latch result to the laser diode driver.

14. (Amended) The apparatus of claim 13, wherein the APC controller samples the counted result from the up/down counter during the enable interval.

22. (Amended) The method of claim 1, wherein the the controlling the power further comprises controlling the power of the laser diode only at non-effective data areas of the disc.

23. (Amended) The method of claim 1, wherein the the controlling the power further comprises generating the synchronization signal selectively in accordance with a sub automatic power control (APC) mode, an average APC mode and a sub-average APC mode for the disc.

25. (Amended) A method of controlling power of a laser diode emitting laser light on a disc by using a difference between a level of the laser light reflected by the disc and a reference level, the difference being detected after the laser light level reflected by the disc is compared with the reference level, the method comprising:

generating a periodic synchronization signal;

controlling the power of the laser diode in synchronism with the synchronization signal; and

adjusting the reference level based upon a read mode, a record mode and an erase mode for the disc, wherein the adjusting of the reference level comprises:

adjusting the reference level to a first value if the mode for the disc is the read

mode,

adjusting the reference level to a second value if the mode for the disc is the

erase mode for lands of the disc,

adjusting the reference level to a third value if the mode for the disc is the erase mode for grooves of the disc,

adjusting the reference level to a fourth value if the mode for the disc is the record mode for the lands of the disc, and

adjusting the reference level to a fifth value if the mode for the disc is the record mode for the grooves of the disc.

26. (Amended) The method of claim 1, wherein the the controlling the power further comprises:

up/down counting according to the average compared result to determine a counted result;

latching the counted result in accordance with the synchronization signal, to determine a latched power signal; and

wherein the controlling the power of the laser diode in accordance with the average compared result further comprises controlling the power of the laser diode in accordance with the latched power signal.

28. (Amended) A method of controlling power of a laser diode emitting laser light on a disc by using a difference between a level of the laser light reflected by the disc and a reference level, the difference being detected after the laser light level reflected by the disc is compared with the reference level, the method comprising:

generating a periodic synchronization signal; and

controlling the power of the laser diode in synchronism with the synchronization signal, wherein the controlling the power comprises:

comparing a level of the power of the laser diode to the reference level;

up/down counting according to the compared result to determine a counted result; and

latching the counted result in accordance with the synchronization signal, to determine a latched power signal;

wherein:

the controlling comprises controlling the power of the laser diode in accordance with the latched power signal; and

the up/down counting comprises

up/down counting the counted result to generate a first count in a read mode for the disc,

up/down counting the counted result to generate a second count in an erase mode of lands of the disc,

up/down counting the counted result to generate a third count in the erase read mode for grooves of the disc,

up/down counting the counted result to generate a fourth count in a record mode of the lands of the disc; and

up/down counting the counted result to generate a fifth count in the record mode for the grooves of the disc, and

selectively using the first through fifth counts as the counted value for the latching of the counted result.

38. (Amended) An apparatus for controlling a power of a laser diode emitting light on a disc, the apparatus comprising:

a laser driver which controls the power of the laser diode in accordance with a control signal; and

a control circuit which generates the control signal in synchronism with a periodic synchronization signal by:

sampling the difference between the level of the laser light and the reference level to produce a sampled difference;

calculating an average of a predetermined number of the sampled difference to produce an average compared result; and

controlling the power level of the laser diode according to the average compared result.

40. (Amended) The apparatus of claim 39, wherein the power signal circuit comprises:

a comparator which compares the detected power level of the laser diode with a reference level; and

an up/down counter which up/down counts according to the output of the comparator to determine a counted result, wherein the counted result is input as the power signal to the automatic power controller.

43. (Amended) An apparatus controlling a power of a laser diode emitting light on a disc, the apparatus comprising:

a laser driver which controls the power of the laser diode in accordance with a control signal; and

a control circuit which generates the control signal in synchronism with a periodic synchronization signal, the control circuit comprising:

a detector which detects the light reflected from the disc, to generate a detected power level of the laser diode;

a power signal circuit which generates a power signal in accordance with the detected power level, the power signal circuit comprising:

a comparator which compares the detected power level of the laser diode with a reference level; and

an up/down counter which up/down counts according to the output of the comparator to determine a counted result, wherein the counted result is input as the power signal to the automatic power controller; and

a reference value generator which adjusts the reference level based upon a read mode, a record mode and an erase mode for the disc; and

an automatic power controller which latches the power signal in synchronism with the synchronization signal, to generate the control signal;

wherein, the reference value generator comprises:

a first latch which adjusts the reference level to a first value if the mode for the disc is the read mode,

a second latch which adjusts the reference level to a second value if the mode for the disc is the erase mode for lands of the disc,

a third latch which adjusts the reference level to a third value if the mode for the disc is the erase mode for grooves of the disc,

a fourth latch which adjusts the reference level to a fourth value if the mode for the disc is the record mode for the lands of the disc,

a fifth latch which adjusts the reference level to a fifth value if the mode for the disc is the record mode for the grooves of the disc; and

a multiplexer which selectively outputs the second through fifth values according to whether a current mode is the erase or record mode and whether a current track is the land or groove; and

the comparator comprises:
 a first comparator which compares the first latched value and the
 detected power level in the read mode, and
 a second comparator which compares the second latched value and the
 detected power level in the erase or record mode.

45. (Amended) An apparatus for controlling a power of a laser diode emitting
 light on a disc, the apparatus comprising:
 a laser driver which controls the power of the laser diode in accordance with a
 control signal; and
 a control circuit which generates the control signal in synchronism with a periodic
 synchronization signal, the control circuit comprising:
 a detector which detects the light reflected from the disc, to
 generate a detected power level of the laser diode;
 a power signal circuit which generates a power signal in accordance with the
 detected power level, the power signal circuit comprising:
 a comparator which compares the detected power level of the
 laser diode with a reference level; and
 an up/down counter which up/down counts according to the
 output of the comparator to determine a counted result, wherein the counted result is input as
 the power signal to the automatic power controller; and
 an automatic power controller which latches the power signal in synchronism
 with the synchronization signal, to generate the control signal;
 wherein the up/down counter comprises:
 a first up/down counter which up/down counts the counted result to
 generate a first count in a read mode for the disc,
 a second up/down counter which up/down counts the counted result to
 generate a second count in an erase mode of lands of the disc,
 a third up/down counter which up/down counts the counted result to
 generate a third count in the erase read mode for grooves of the disc,
 a fourth up/down counter which up/down counts the counted result to
 generate a fourth count in a record mode of the lands of the disc, and
 a fifth up/down counter which up/down counts the counted result to
 generate a fifth count in the record mode for the grooves of the disc; and

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the automatic power controller selectively uses the first through fifth counts as the counted value for the latching of the counted result.

A13
52. (Amended) The apparatus of claim 51, wherein the synchronization signal is a mirror or gap signal of a clock signal divided by a ratio into a division signal.

A14
54. (Amended) The apparatus of claim 53, wherein the control circuit comprises:
a comparator which compares the detected power level with a reference signal;
a power level generator which generates a power level signal in accordance with the output of the comparator;
an automatic power controller which latches the power level signal in accordance with a synchronization signal to determine a latched power level signal; and
a laser diode driver which supplies the latched power level signal to the laser diode to control the power of the laser diode.

55. (Amended) The apparatus of claim 54, wherein the synchronization signal is a mirror signal, a gap signal or a clock signal to drive the disc divided by a ratio into a division signal.

56. (Amended) An apparatus for controlling a power of a laser diode emitting light on a disc, the apparatus comprising:
a laser driver which controls the power of the laser diode in accordance with a control signal; and
a control circuit which generates the control signal in synchronism with a periodic synchronization signal, wherein the control circuit comprises:
a detector which detects the light reflected from the disc, to generate a detected power level of the laser diode,
a power signal circuit which generates a power signal in accordance with the detected power level wherein the power signal circuit comprises:
a comparator which compares the detected power level of the laser diode with a reference level, wherein the comparator comprises:
a first comparator which compares the first latched value and the detected power level in the read mode, and
a second comparator which compares the second latched

value and the detected power level in the erase or record mode,

an up/down counter which up/down counts according to the output of the comparator to determine a counted result, wherein the counted result is input as the power signal to an automatic power controller, the up/down counter comprising:

a first up/down counter which up/down counts according to the output from the first comparator to generate a first count in a read mode for the disc,

a second up/down counter which up/down counts according to the output from the second comparator to generate a second count in an erase mode of lands of the disc,

a third up/down counter which up/down counts according to the output from the second comparator to generate a third count in the erase read mode for grooves of the disc,

a fourth up/down counter which up/down counts according to the output from the second comparator to generate a fourth count in a record mode of the lands of the disc, and

a fifth fourth up/down counter which fourth up/down counts according to the output from the second comparator to generate a fifth count in the record mode for the grooves of the disc; and

a reference value generator which adjusts the reference level based upon a read mode, a record mode and an erase mode for the disc wherein, wherein the reference value generator comprises:

a first latch which adjusts the reference level to a first value if the mode for the disc is the read mode,

a second latch which adjusts the reference level to a second value if the mode for the disc is the erase mode for lands of the disc,

a third latch which adjusts the reference level to a third value if the mode for the disc is the erase mode for grooves of the disc,

a fourth latch which adjusts the reference level to a fourth value if the mode for the disc is the record mode for the lands of the disc,

a fifth latch which adjusts the reference level to a fifth value if the mode for the disc is the record mode for the grooves of the disc, and

a multiplexer which selectively outputs the second through fifth values according to whether a current mode is the erase or record mode and whether a current track is the land or groove,